CHAPTER 3

COMPUTER EQUIPMENT

Overview

Introduction   You may or may not have experience in doing your job with a computer. However, computers are rapidly supplementing traditional methods of preparing artwork and work intended for reproduction, and you will have to interface with them at some point in your career. Not only is computer literacy becoming a desirable in-service job skill, but it is an essential communications skill in the civilian arena. Learn the vocabulary and learn your way around a computer.

Objectives   The material in this chapter enables you to do the following:

Ž Identify the procedures to clean and inspect computer peripherals.

Ž Identify hardware components.

Ž Correctly install peripheral devices.

Ž Select compatible hardware and software accessories.

Ž Differentiate between hardware and software.

Overview, Continued

Acronyms   The following table contains a list of acronyms that you must know to understand the material in this chapter:

Acronym	Meaning
ALT	Alternate
ASCII	American Standard Code for Information Interchange
BBS	Bulletin Board Service
BIT	Binary Digit
BPS	Bits Per Second
CD ROM	Compact Disk Read-Only Memory
COMPORT	Connector Port
CPS	Characters Per Second
CPU	Central Processing Unit
CRT	Cathode-Ray Tube
CTRL	Control
DEL	Delete
DPI	Dots Per Inch
DTP	Desk Top Publishing
E-MAIL	Electronic Mail
EMR	Electro Magnetic Radiation
EO	Erasable Optical
ESC	Escape
FF	Form Feed

Overview, Continued

**Acronyms
(Continued)**

Acronym	Meaning
GB	Gigabyte
INS	Insert
I/O	Input/Output
KB	Kilobyte
LAN	Local Area Network
LCD	Liquid Crystal Display
LF	Line Feed
MAC	Macintosh
MB	Megabyte
MO	Magneto Optical
NIC	Network Interface Card
PC	Personal Computer
PCL	Printer Control Language
PRTSCRN	Print Screen
RAM	Random Access Memory
ROM	Read-Only Memory
SIMMS	Single Inline Memory Modules
SYSOP	System Operator
VGA	Video Graphics Array
WAN	Wide Area Network
WORM	Write Once/Read Many

Overview, Continued

In this chapter   This chapter covers the following topics:

Hardware

Introduction

Computer hardware is all the equipment and devices associated with the operation of a computer system. Everything that is tangible or touchable regarding the computer is hardware, including the disks used to program the computer. Hardware is divided into input devices, edit devices, output devices, and input/output devices.

General maintenance

Practice the following general maintenance procedures to maintain your computer in peak operating efficiency:

Ž Keep devices clean and free of debris.

Ž Clean the keyboard and button selection areas with a camel hair brush.

Ž Clean optical surfaces with a lint-free cloth or chamois. Check the operating manual to make sure screen surfaces are not covered with a glare preventative spectral coating that spray cleaners could damage.

Ž Clean exterior cases, tabletops, and mouse track with a slightly dampened, lint-free cloth. Dampen the cloth; do not wet the components.

Ž Do not allow food or drink near the keyboard, the mouse track, or the pressure sensitive and electronic tablets.

Ž Inspect connector ports (COMPORTS) and pins for damage.

Ž Carefully align pins and never force a connection when connecting devices.

Input Devices

Introduction   Input devices are devices that allow a system operator (SYSOP) to interface with a computer. You interface with the computer by entering your commands into the computer system through a keyboard, a seamer, a mouse, a trackball or joystick, a pressure sensitive or electronic tablet, or a light pen. These are all input devices.

Keyboards   The keyboard is the primary means for inputting data into the computer. Based on a standard typewriter keyboard, computer keyboards have additional special-purpose keys, function keys, cursor movement keys, and a numeric keypad. Keystrokes input text and characters into memory or on a screen. Combinations of keystrokes prompt key functions such as holding, underlining, and italicizing. An enhanced keyboard minimizes keystrokes by using function keys like F1, F2, and so forth, to access functions or commands. The following table lists special-purpose keys and their function:

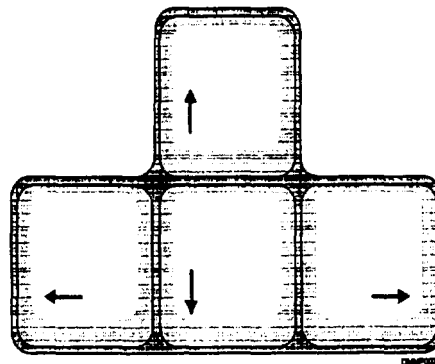| Key	Function
ALT	Alternate; modifies or accesses function
BACKSPACE	Backspace; deletes keystrokes left of the cursor
CTRL	Control; modifies or accesses function
DEL	Delete; removes unwanted keystrokes right of the cursor
ESC	Escape; exits program or situation
HOME	Home; allows rapid scrolling to top or bottom of document
INS	Insert; allows insertion of text or characters
PRTSCRN	Print Screen; sends what is on the screen to printer

Function keys   Function keys are special-purpose keys, numbered F1 through F10, used to communicate specific fictions to the operating system. These keys simplify tasks that might otherwise require several key strokes. These keys can also be used with other keys to increase the number of functions available. The software program in operation defines the function of these keys. Be sure to read the software owner/user manual to understand the purpose of these keys. These keys are generally located at the top of the keyboard.

Cursor movement keys   Cursor control keys move the cursor from one place to another on the display screen. The cursor is the indicator on the display screen that lets the user know where the next entry will be made. Cursor control keys have an arrowhead printed on them pointing in the direction that the key will move. Some keyboards have a separate set of keys for cursor movement; others have the cursor movement keys incorporated into the numeric keyboard. As long as the NUM LOCK key is OFF, the cursor movement keys function. Some software packages use the cursor control keys in combination with each other or with other keys to increase the number of ways and the speed with which you can move the cursor. Another cursor movement key — the SCROLL LOCK/BREAK key – controls screen scrolling. When in the BREAK mode and used in conjunction with the CTRL key, the SCROLL LOCK key will interrupt program execution.

Figure 3-1 shows cursor movement keys.

Figure 3-1. -Cursor movement keys.

Numeric keypad

To perform mathematical functions, use the numeric keypad as you would a calculator. To activate the numeric keypad, press the NUM LOCK key. If you do not press the NUM LOCK key, the numeric keypad will function as cursor control keys.

Figure 3-2 shows a numeric keypad. Note the location of the cursor movement keys on the numeric keypad.
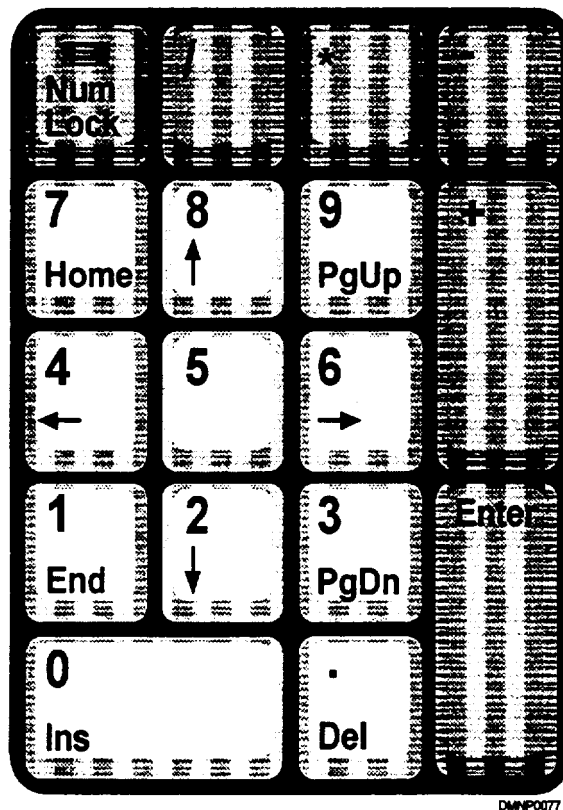

Figure 3-2. —Numeric keypad.

Input Devices, Continued

Scanners

A scanner allows you to copy a photograph, a drawing, or a text page into the memory of the computer. It does this by measuring tonal or color values and converting them into a binary code that the computer can digest. You may then "clean-up" the image using the appropriate software program before printing a final copy for reproduction. Software for the scanner is as important as the scanner. The software provides for image manipulation and export format compatibility. A scanner is particularly useful for copying large amounts of text or images not previously saved on disk that now require revision. When using a scanner, be careful not to violate an existing copyright.

Grey scale scanners

Grey scale scanners read tonal values and assign density code numbers. The density code is available from 16 to 256 levels of grey. For general-purpose work, select a software program that offers a minimum of 64 levels of grey.

Color scanners

A color scanner reads color value and assigns it a binary code for export. This scanner will range from 70 to 600 dots per inch (DPI) with 24 binary digits (bits) of color. For general-purpose work, select a software program that offers a range between 300 and 600 dpi.

Scanner types

The four types of scanners are the hand scanner, the flatbed scanner, the copystand scanner, and the slide scanner.

HAND SCANNERS: Hand scanners are useful for small quantity scanning. They read portions or excerpts from a document page into the memory of the computer.

FLATBED SCANNERS: Flatbed scanners scan pages out of a book. They scan an entire one- or two-page spread in one view.

COPYSTAND SCANNERS: Copystand scanners are capable of scanning three-dimensional objects.

SLIDE SCANNERS: Slide scanners scan slides and transparencies into memory. Scanners used to scan slides and transparencies require a mirrored or reflective attachment.

Mice

A mouse is an input device that allows the SYSOP to stroke functions and commands rapidly into the computer without touching a keyboard. It also provides a synchronous movement for drawing. The two types of mice are the mechanical mouse and the optical mouse. The mechanical mouse fits in the palm of the hand and rolls around either on a small ball or on small wheels that roll around the ball. This movement moves the cursor on the screen. The optical mouse also moves the cursor, but it uses a beam of light on a reflective mouse pad. Press or click the mouse buttons to access functions or commands.

Figure 3-3 shows a mechanical mouse on a mouse pad. The mouse pad protects the ball inside the mouse from collecting dust from the tabletop.

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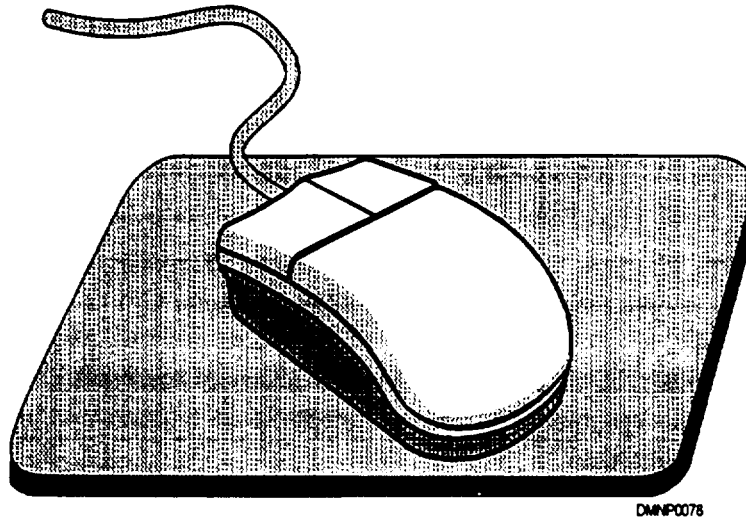
Figure 3-3. —A mechanical mouse.

Joysticks and trackballs

Joysticks and trackballs are like mice in that they allow rapid access to functions; however, they are most often used in game playing or contests of skill. They resemble cockpit wheels, triggers, and guns.

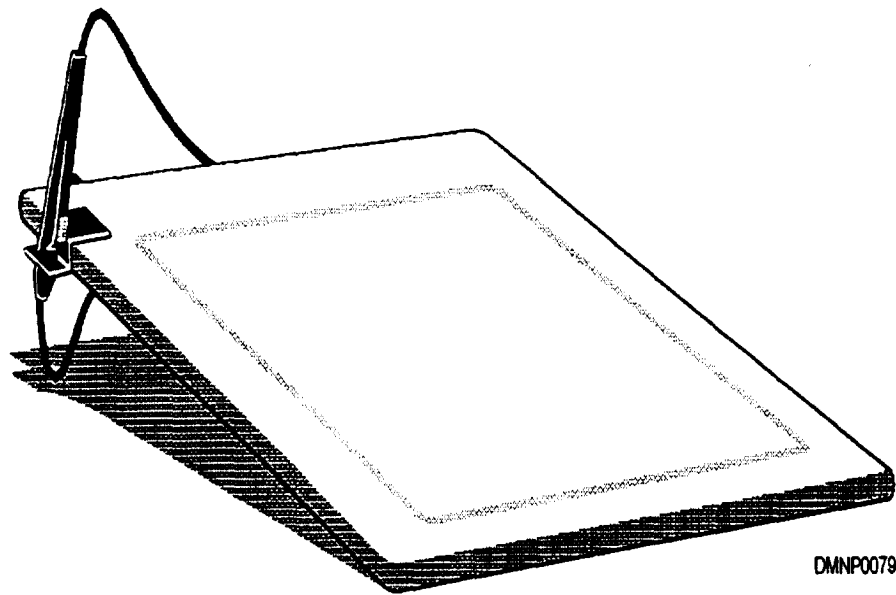**Pressure sensitive or electronic tablets**

Pressure sensitive and electronic tablets are primarily freehand drawing devices. Sensitive to pressure from the hand, the tablet recreates the thick and thin strokes made on the tablet to the screen.

Figure 3-4 shows a pressure sensitive or electronic tablet.

DMNP0079

Figure 3-4. —A pressure sensitive or electronic tablet.

Light pens

Light pens are similar to ball-point pens; however, the drawing surface is the screen itself. The light pen activates the photoelectric circuits of the screen to produce an image.

Microphones

Microphones prompt voice activated computers to perform specific functions. The computer recognizes a voice pattern and responds by following the command. Similarly, musical instruments can be fed through a computer to create electronically enhanced recordings.
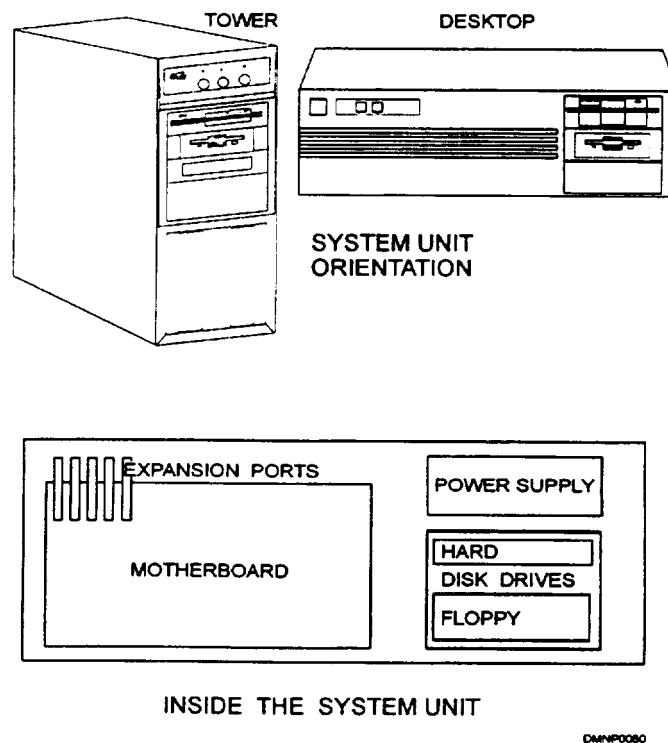
Edit Devices

Introduction   The primary editing device of a computer is the system unit that houses the central processing unit (CPU) and the disk drive. The CPU reads software and directs the actions of the peripherals, and the disk drive electronically stores and retrieves software and information.

System unit   The large box that encloses the CPU and the disk drive is called the system unit. A horizontally oriented system unit lies flat on a desk top. A system unit that stands upright is a tower unit. The system unit houses the motherboard, the disk drives, the power supply, and the expansion ports.

Figure 3-5 shows a system unit.

Figure 3-5. —The system unit.

Edit Devices, Continued

Motherboard   The motherboard or system board is the master printed circuit board that holds the CPU chip, the Random Access Memory (RAM) chips, the Read Only Memory (ROM) chips, a math co-processor, extra memory slots, and the computer clock.

Central Processing unit (CPU)   The CPU is a integrated circuit (IC) chip on the motherboard. It is a mass of transistors that coordinate all activities of the computer. It accepts input, interprets software, and provides output. The CPU chip also controls the speed or processing power of the computer. The two types of CPUs are PCs (personal computers that are IBM compatible or clones) and MACs (Macintosh or Apple exclusives). The main difference between the two is how the user interfaces with the system. You may find either type in your work space. Users refer to their computer by the CPU chip numerical generation, such as 386 or 486, inside the system unit.

Random Access Memory (RAM)   Random Access Memory, or RAM memory chips, randomly store and transmit information from memory or a disk. Sometimes referred to as read/write memory, RAM memory chips determine what programs your computer is capable of running and how much information you are able to store.   Ram memory is short term in nature; that is, you must save the information or it will disappear when you turn the machine off. You enlarge the memory of your computer by installing chips of a larger rated capacity. Memory chips store bytes of information in kilobyte (KB), megabyte (MB), or gigabyte (GB) increments. Word processing and graphics software require a great deal of memory so be sure to coordinate or upgrade the memory capacity of the computer when you select software packages.

Read Only Memory (ROM)   Read Only Memory (ROM) is the memory required by the computer to read a disk. ROM will remain in memory until it is removed. This memory does not allow overwriting or modification. Generally, the operating system instructions of the computer are in ROM circuitry.

Edit Devices, Continued

Math co-processor

The math co-processor assists the CPU chip in performing mathematical functions. In most computers, this is a feature that is automatically built into the motherboard circuitry.

Expansion slots

On the motherboard, there are extra connections for enlarging the capabilities of the computer. Features such as extra memory chips, called single inline memory modules (SIMMS), a video graphic array (VGA), and network interface cards (NICs), plug into these expansion ports to expand computer versatility. When you upgrade software or make additional software purchases, you may have to enlarge the memory capacity of the computer.

Clock

On the motherboard inside each computer, there is a clock. The clock coordinates and paces the functions of the computer.

Figure 3-6 shows the motherboard and the basic circuitry found on it.
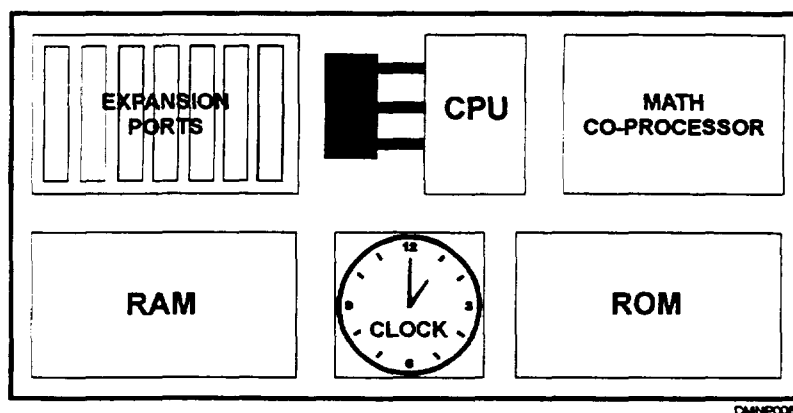
Figure 3-6. —The motherboard.

Disk drives

Also inside the system unit, there is the disk drive or a combination of disk drives. A disk drive provides direct access to data on a disk for electronic storage and retrieval. The two basic types of disk drives are the floppy disk and the hard disk drive. Hard disk drives can be removable as a precautionary measure of protection for the data stored on the drive.

Floppy disk drive

Floppy disk drives play and record on floppy diskettes. There are openings on the face of the system unit for the insertion of a floppy disk. Inside the disk drive are electronic heads that read and write. Single-sided disk drives read/write on one side of the disk. Double-sided disk drives have read/write heads on both sides. The electronic heads in each floppy disk drive read/write slower than those of a hard disk drive.

Floppy disks

Floppy disks are round, flexible platters covered with magnetic oxide and encased in a sturdier plastic envelope. The envelope is lined with a soft material that continuously cleans the disks, as it spins inside the envelope. The diskette has a hole in the middle, called a center hub. Also on the envelope, there is a recording window that allows the read/write heads access to the disk surface. Disks have a notch in the upper right-hand comer which is a write protect feature to prevent the user from accidentally recording over existing data. New disks are blank; therefore, you must initially format every disk you use in your computer. The diskettes used with a floppy disk drive come in two sizes: 5 1/4 and 3 ½ inch. The following table explains other diskette features:

Feature	Meaning
Single-sided	Records on one side only
Single density	256 byte capacity per sector
Double-sided	Records on both sides of disk
Double density	512 byte capacity per sector
Quad density	1,024 byte capacity per sector

Edit Devices, Continued

Floppy disks (Continued)   Figure 3-7 shows floppy disks and their nomenclature,

5 1/4 inch

3 1/2 inch
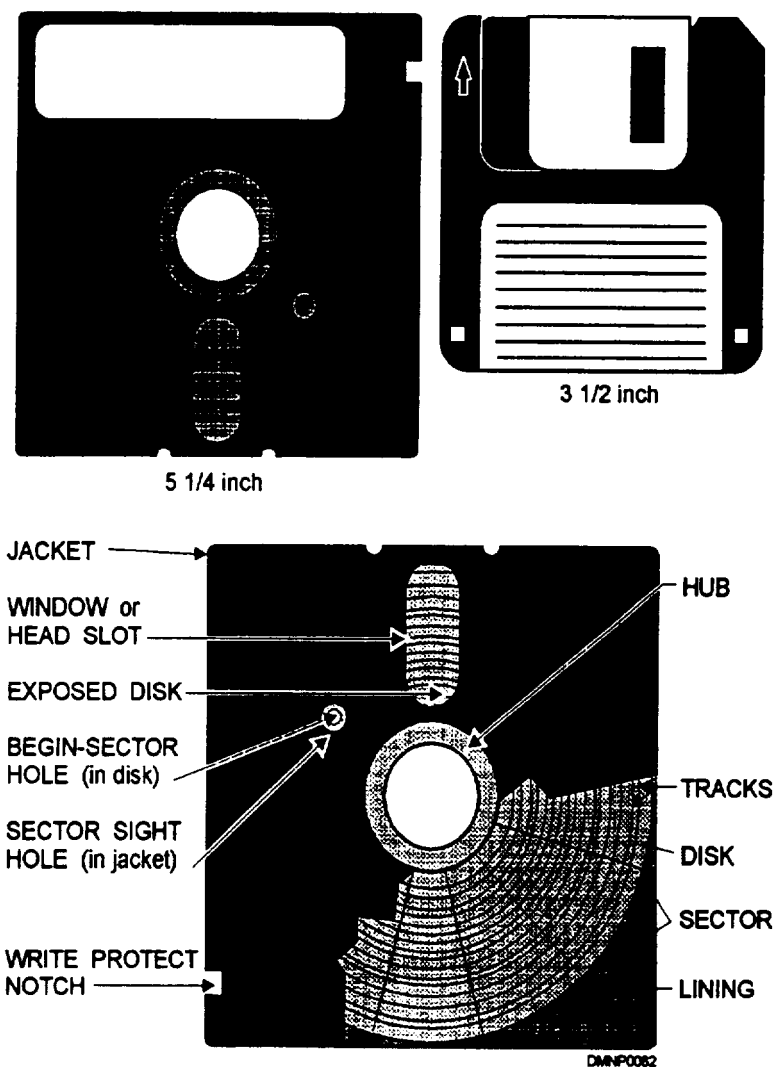

JACKET

WINDOW or HEAD SLOT

EXPOSED DISK

BEGIN-SECTOR HOLE (in disk)

SECTOR SIGHT HOLE (in jacket)

WRITE PROTECT NOTCH

HUB

TRACKS

DISK

SECTOR

LINING

DMNP0082

Figure 3-7. —Floppy disk nomenclature.

Hard disk drives	Hard disk drives are generally part of the system unit. These sealed units are inside the unit as stacks or tiers of rigid metal platters that are not removable. Some of the advantages of hard disk drives are their increased speed of execution and memory capacity. Hard disk storage capacities range from 50 MB to 2 GB. Also, there is no need for you to open, close, file, or find a diskette manually and no initialization or rebooting, as there is with a floppy disk.
Removable hard disk drives	Data that is sensitive information and requires protection, such as classified material or advancement examinations and results, belongs on a removable disk drive. Programs which are large and memory intensive also belong on a removable hard drive. Removable hard disk drives are just like built-in hard disk drives except for their portability. You can physically remove a removable hard disk drive from the system unit for safekeeping in a secure area, such as a safe.

Figure 3-8 shows a removable hard disk drive.
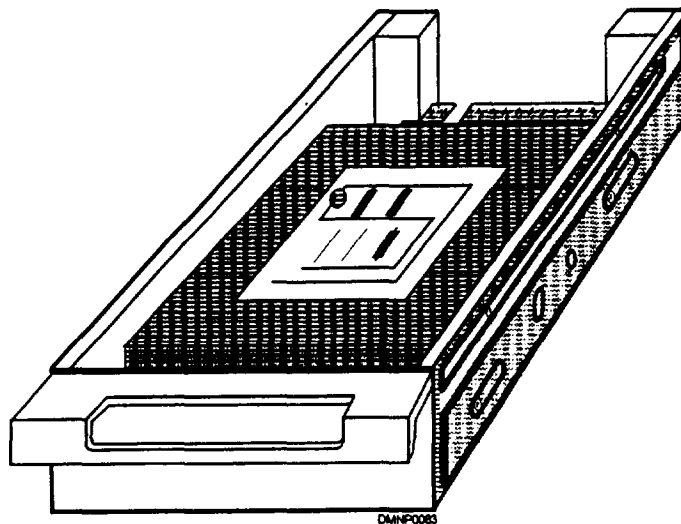
Figure 3-8. —A removable hard drive.

Edit Devices, Continued

Compact Disk Read Only Memory (CD ROM)

A compact disk read only memory (CD ROM) drive is a disk drive that reads data stored on computer disks. It can be internal or external to the system unit. CD ROM is used when many users need the same information and the nature of the information remains constant over time. The expression Write Once/Read Many (WORM) describes this type of technology. On CD ROM, information once recorded cannot be erased or changed, only read many times.

Video Graphics Array (VGA)

One piece of hardware that controls the size and resolution of what you see on the computer screen is a Video Graphics Array (VGA) or graphics card, This card, located on the motherboard, intervenes between the CPU and the monitor to control the screen display. This graphics card is extremely important to you as a DM. When you assess the capabilities of your computer, you should consider upgrading your graphics card to a Super Video Graphics Array. VGA boards are available as a grey scale display board or as a color display board. Grey scale display boards have 4 to 8 bits per pixel (picture element) and offer from 70 to 256 levels of grey. Color display boards have 8 to 24 bits per pixel and offer smooth blends and continuous color.

Output Devices

Introduction   After you enter all the data into the computer and the CPU has had time to process the information, it exits the computer through an output device. Monitors, plotters, printers, and film recorders are output devices. They provide the SYSOP with an image or hard copy data.

Monitors   Monitors provide visual feedback of work in progress. The three types of monitors are the analog monitor which is similar to a television set but provides only a video display, the digital monitor which processes data as a numeric value and provides only a textural display, and the multi synchronous monitor which provides both analog and digital information.

Multi synchronous monitors   Multi synchronous monitors are capable of processing both analog and digital information. They work on any computer system displaying text and graphics with superb resolution and can vary resolution at the SYSOP discretion. Resolution is the number of pixels per inch and is referred to as dots per inch (DPI). The dpi in height and dpi in width define the display of the monitor. A 17- or 20-inch monitor rated at 640 by 480 dpi or higher is a good monitor for general-purpose work. This is the type of monitor you will most likely be using.

Plotters   Plotters are output devices used for large linear drawings. The drawing or design is conveyed to the paper surface by plotting a series of points and connecting them with lines. Plotters are most often used for drafting or map making.

Output Devices, Continued

Printers

Printers provide a hard copy printout of data stored electronically inside the computer or from a disk. The two types of printers are impact printers and nonimpact printers.

Impact printers

Impact printers operate in the same manner as do typewriters. They are either front striking where a print hammer strikes a character against an inked ribbon and paper or hammer striking where print hammers strike a character against paper first and then an inked ribbon. Impact printers print one character at a time at speeds from 30 to 350 characters per second (CPS). Impact printers use standard single, multipart, and continuous-form paper. Dot matrix printers and daisy wheel printers are impact printers.

Dot matrix printers

A dot matrix printer creates a character with a series of tiny pins or wires that strike the ribbon or page and leave an image in dots. The resolution of the matrix is defined in terms of rows and columns of dots. A 7 by 9 matrix uses seven dots horizontally and nine dots vertically to create a character. Some dot matrix printers have a 36 by 24 matrix. The size of the matrix determines the quality of the printed character. Dot matrix printers are near letter quality, faster than daisy wheel printers, and have speeds ranging from 60 to 350 cps.

Figure 3-9 shows the letter 'L' created by a dot matrix printer,
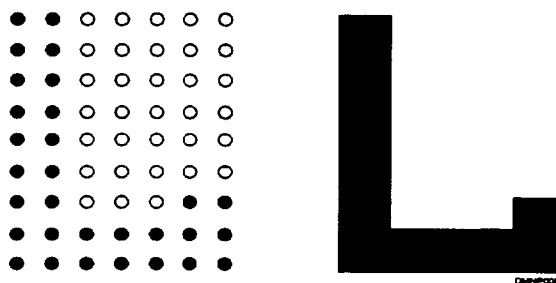
Figure 3-9. —The letter "L" on a dot matrix printer.

**Daisy wheel
printers**

Daisy wheel printers are very similar to typewriters. The flat, circular printing element contains all text and numeric characters. The element spins rapidly, pausing only to allow the printing hammer time to strike the character against the ribbon or paper. Daisy wheel printers are letter quality printers but they tend to be slow.

Figure 3-10 shows a daisy wheel printer printing element.
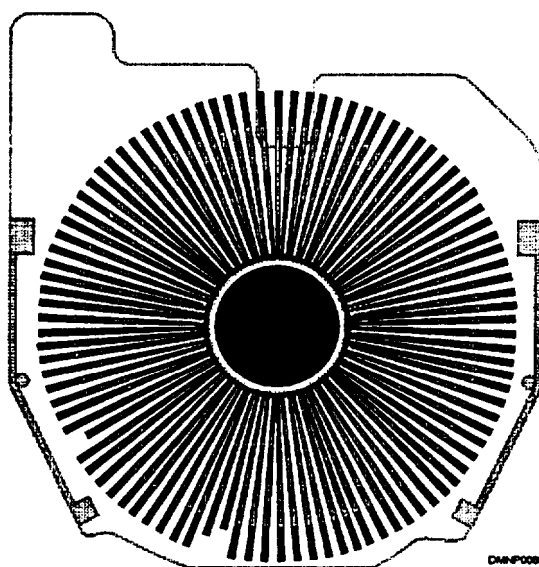
**Figure 3-10. —A daisywheel printing
element.**

**Nonimpact
printers**

Nonimpact printers do not make contact with paper or ribbon during printing. They use several techniques for printing, such as xerographic, electrostatic, electrosensitive, electrothermal, ink jet, and laser. Nonimpact printers are the fastest of printers with speeds approximating 20,000 lines of print per minute. They are also much quieter than impact printers. Some of the disadvantages are that they produce one copy at a time, sometimes require specially treated paper stock, and the printed output may blur.

Output Devices, Continued

Nonimpact printer types

Thermal transfer, ink jet, laser, wax, continuous tone die sublimation, and color phase change are nonimpact printers that you may find in a Navy shop.

THERMAL TRANSFER PRINTERS : Thermal transfer printers use wax or ink dies from a heated printing element to transfer an image to a page.

INK JET PRINTERS: Ink jet printers spray electrically charged ink through tiny nozzles in the printing element. The ink passes through an electrically charged field that forms the image in matrix form. These printers offer very high-quality resolution and print up to 300 cps.

LASER PRINTERS: A laser printer directs a beam of light that electrically charges an image on a photosensitive drum. Toner attracts and adheres to the dots on the drum and a heating element fixes the image on the paper. These printers can print in excess of 20,000 lines per minute.

WAX PRINTERS: Wax printers use a ribbon of thin transparent wax. Ribbons are available in color and are useful for transparencies.

CONTINUOUS TONE DIE SUBLIMATION: Continuous tone die sublimation uses color dies on a plastic film for image transfer. This is a thermal transfer and requires specially coated papers.

COLOR PHASE CHANGE: A color phase change uses Pantone certified colors in a wax medium. Like continuous tone die sublimation, this is a thermal transfer, but it does not require specially coated paper.

Output Devices, Continued

Printer control There are several buttons that control the functions of the printer. To setup printer functions manually, you must first put the printer in an Offline status. The following list contains some of the more common buttons:

Printer control buttons

Button	Function
COPY	Reprints data previously stored in the printer buffer.
FORM FEED (FF)	Advances the printer to the top of the form or next page.
LINE FEED (LF)	Advances the paper one line at a time.
MODE	Selects print quality; draft, high-density, or letter-quality.
ONLINE	Turns the printer on- and off-line. Offline, a printer cannot receive data. Online, the operating system software controls the printer.
PITCH	Selects the number of characters to print per inch; 10, 12, or 17 characters per inch.
RESET	Clears all data from the print buffer.
SPACING	Adjusts spacing of characters and words; normal or proportional.
TOP-OF-FORM	Advances the paper 1 1/2 inches and redefines the top of the form.
TYPESTYLE	Font selection.
UP/DOWN	Critical or fine adjustments in the paper position.

Output Devices, Continued

Printer indicator lights   Indicator lights, located above the control buttons, provide printer status information and functions or features currently in effect. The following list contains the more common indicator lights:

Light	Function
ERROR	Warns of a problem that makes the printer inoperable.
ONLINE	Shows when the printer is in an online status during which time all other control buttons are inoperative.
POWER	Indicates that power is reaching the printer.
TYPESTYLE, MODE, PITCH, and SPACING	Located above each button and next to each feature, these lights indicate the current operating modes of the printer. The lights are lit next to the selected features.

Printer loading   A printer receives paper by being single sheet fed or tractor fed. Single sheet fed is much like a standard copier paper tray in which paper stacks on the side of the printer and enters the printer one sheet at a time. Tractor fed paper is a long continuous sheet of paper with perforations and a series of holes on each side. These holes fit onto tractor wheels under the front cover of the printer. Location of and space between the tractor wheels is adjustable. When it is necessary for you to change the tractor wheel position, always leave the left tractor wheel in the same position and make the adjustments to the right tractor wheel. This way all documents will begin the page at the same location.

Output Devices, Continued

Printer loading (Continued)

Figure 3-11 shows the difference between single sheet fed and a tractor fed paper.

SINGLE SHEET   CONTINUOUS SHEET (TRACTOR FED)
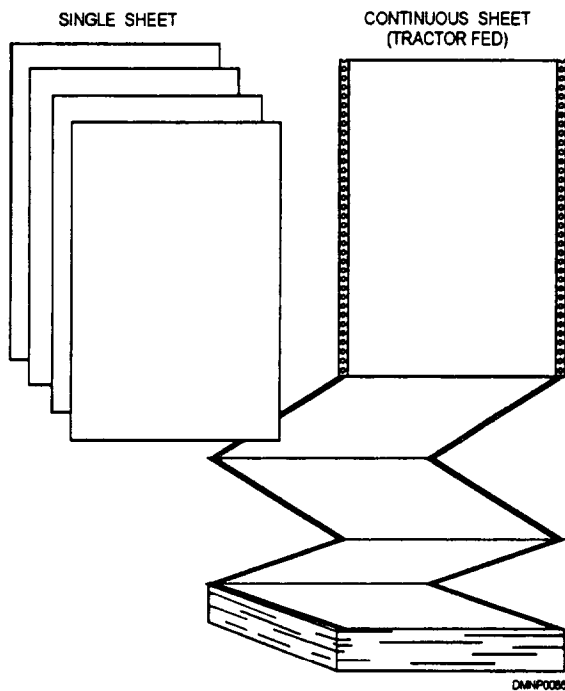
Figure 3-11. —Single fed and tractor fed paper.

To load a tractor fed printer, use the following table:

Step	Action
1	Raise the soundproof cover of the printer.
2	Move the print unit release lever toward you.
3	Swing unit toward you to expose the tractor fed wheels.
4	Open the tractor wheel lock to access the wheel spokes and load/unload paper.

Output Devices, Continued

Film recorder   A film recording device attached to a computer system provides 35mm slides and negatives of the screen output. It is a lighttight box with a small camera inside. The lens conventionally photographs the image from the CRT screen. The film is conventional photographic film and processes normally.

Figure 3-12 shows a film recording device.

35mm CAMERA   CRT   DMNP0087
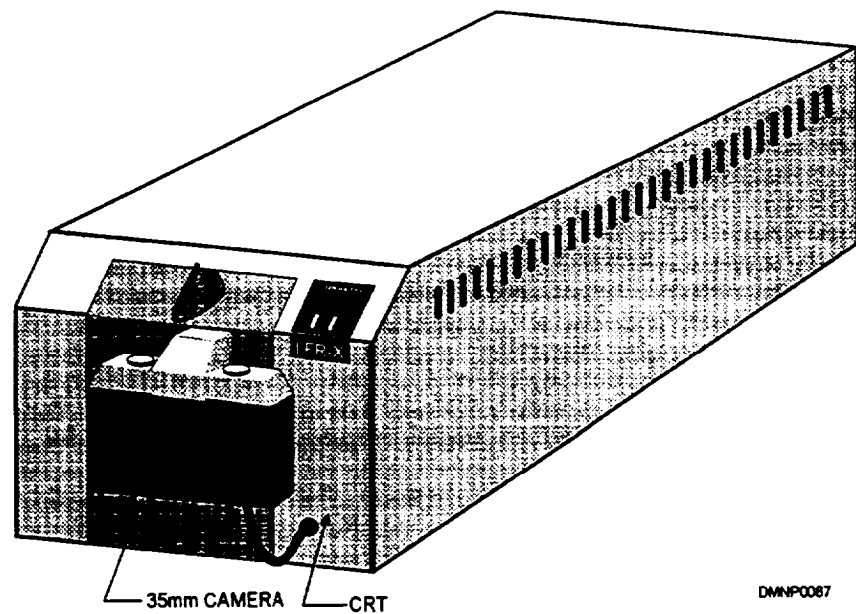
Figure 3-12. —A film recording device.

Input/Output Devices

Introduction   Devices that provide both input and output to the system unit are called input/output (I/O) devices. A modem is an I/O device as is a communications local area network (LAN) or a wide area network (WAN) NIC.
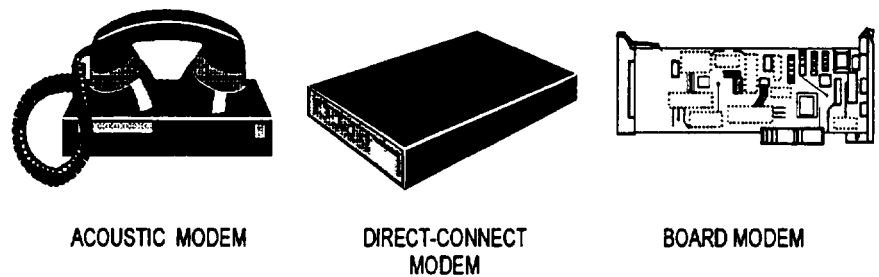
Moderns   A modem is an electronic connection, usually via telephone, between your computer and others. Modems exchange files and data with other computers via local networks or telephone connections. Fax moderns link a fax machine to a modem for the direct transfer of an image to the originator. Modems can be stand alone or board units. Stand alone units may be acoustic modems in which a cradle holds a telephone headset and you dial the phone number of the computer system to establish a link or direct-connect modems that plug directly into a phone line. Board modems are built onto plug-in boards that insert into the expansion ports inside the system unit of the computer.

Figure 3-13 shows three different types of modems.

ACOUSTIC MODEM   DIRECT-CONNECT   BOARD MODEM
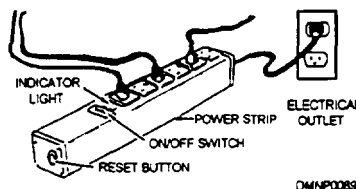MODEM

DMNP0088

Figure 3-13. —Modems.

Microcomputer Setup

Introduction

You may or may not have a computer in your work space. However, your understanding how to setup a computer system will help you initially integrate a computer system into your work space and troubleshoot simple computer problems.

Owner's manuals

Owner/user manuals explain all about the hardware and how to install and configure it. Become familiar with the documentation that comes with your computer system and the peripherals. Spend time learning all you can about the hardware and software. Start setting up the computer system by thoroughly studying the installation instructions.

Power requirements

Most microcomputers have a range of 100 to 130 volts or 200 to 230 volts alternating current. On the back panel of the system unit, there is a voltage or line select switch. Make sure your computer and all supporting devices are set to the appropriate line voltage supplied to the electrical outlets in your work space.

Surge protectors

A surge protector is a power strip that prevents abnormally high-power fluctuations from damaging the computer. A high-voltage surge can overload and burn up internal components. Most surge protectors can accommodate multiple electrical plugs. First, plug the system unit and supporting devices into the surge protector and then plug the protector into the electrical outlet. This allows you to turn all of your equipment ON or OFF with one switch. Before you make any type of connection, be sure the ON/OFF switch on the surge protector is OFF and remove the plug from the wall socket.

Figure 3-14 shows a surge protector.


Figure 3-14. —A surge protector.

Microcomputer Setup, Continued

System unit   On the back of the system unit, there are connection ports (COMPORTS) and a power cord connector. The monitor, the keyboard, and the printer will connect to the system unit COMPORTS. The system unit power cord will connect to the surge protector.

Monitor   On the back of the monitor, there is a power cable and a video input cable. There also may be a voltage selection switch. The video input cable plugs into the back of the system unit where the video display board is located. The power cord plugs into the surge protector.

Keyboard   The keyboard plugs into the back of the system unit with a five-pin connector.

Printer   The printer has a power cable and a data cable. The data cable connects to the system unit. The power cable plugs into the surge protector.

Cable connection   Most cables or connectors have some sort of device to ensure a firm, tight connection between devices. This device may be a couple of screws or a cable lock. When you plug in a cable, make sure it is properly and firmly seated, then tighten down the cable connection locking device. Never force a cable connection.

Figure 3-15 shows typical cable locks.
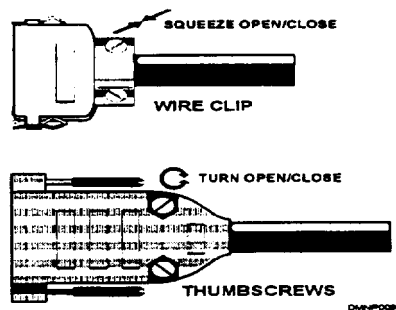
Figure 3-15. -Cable locks.

Microcomputer Setup, Continued

Connection relationships   Figure 3-16 shows the relationship of the computer system and the peripheral devices covered in this chapter.

DATA SYSOP

INPUT DEVICES
* KEYBOARD
* MOUSE
* JOYSTICK
* TRACKBALL
* LIGHT PEN
* TABLETS
* SCANNERS

EDITING DEVICES
* SYSTEM UNIT
  - MOTHERBOARD
  - CPU
  - RAM
  - ROM
* DISK DRIVES
* CD ROM

OUTPUT DEVICES
* MONITOR
* PRINTER
* PLOTTER
* FILM RECORDERS

I/O DEVICES
* MODEM
* LAN NIC
* WAN NIC

HARD COPY
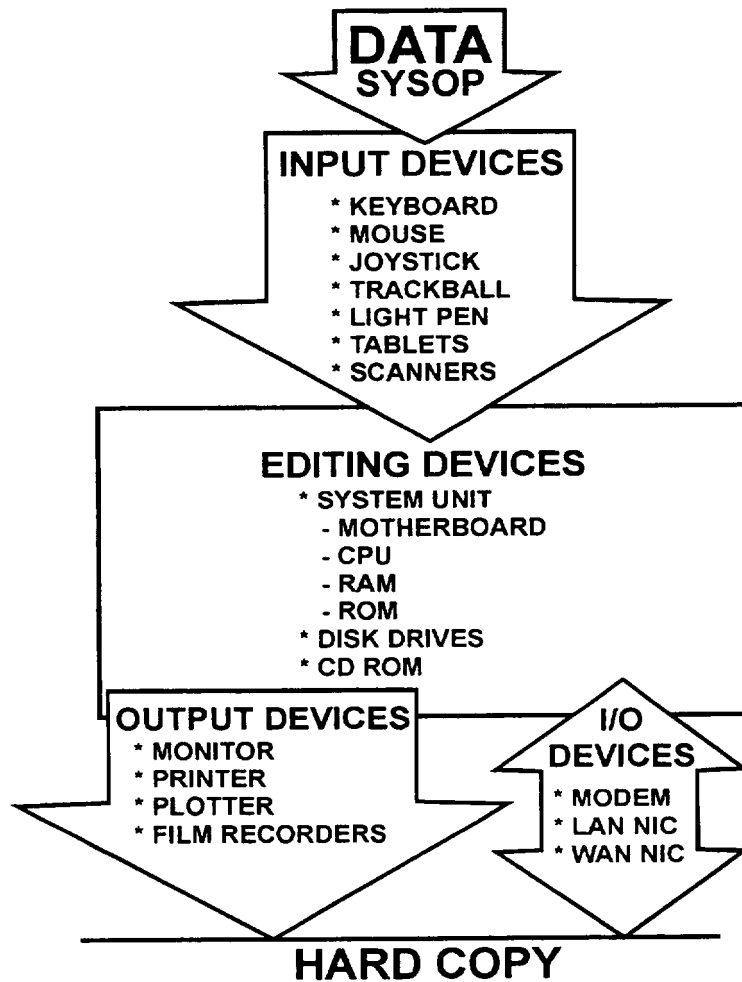
DMNP0091

Figure 3-16. —Connector relationships.

Software

Introduction	Software is the set of instructions, program parameters, or data stored on a disk. Remember, the disk itself is hardware; the data on the disk is software. The two categories of software are operating system software and applications software.

Operating system software

Operating system software manages the operation of the entire computer Its primary job is to manage the system and system resources, such as the disks, the printers, and the modems. It also helps you to communicate with the computer to use applications software. Install the operating system program into the system hard drive with the distribution disks before attempting to load any other program. Follow the owner/user manual. The owner/user manual will tell you the setup command that will lead you through the process from the display screen. Once you have the operating system installed, put the original distribution disks in a safe place.

Applications software

User or application software is program disks that help you to accomplish a specific goal, such as DOS, Windows (PC), or System 7 (MAC). Distribution disks for applications software require information about the microcomputer configuration. Software programs have differing requirements; therefore, refer to the owner/user manual for installation. Once you have installed the applications software, put the original distribution disks in a safe place.

Using software

Consciously develop a good, systematic approach in your work habits. Have your reveal codes displayed on the screen while you are working. This allows you to see any coding errors in the document. You will find it easier to make corrections to the text of a document when you eliminate coding errors. Break the habit of hitting the ENTER or RETURN key; it unnecessarily enters an undesirable hard return. Save the current document periodically. Do this more often than relying just on the timed backup feature. This will lessen data loss should the system crash or freeze. Another excellent work habit is to save all documents on working copy disks. This saves memory space, facilitates safeguarding and protection, and should the computer develop a virus or lose data during power fluctuations, the damages would be recoverable. Although initially cumbersome, these habits will prove well worth your effort to cultivate and maintain.

Text Programs

Introduction

Nearly every microcomputer in the Navy has some sort of word processing program installed on it. These programs make it easier for us to complete the myriad of administrative tasks demanded of us. To a DM, they are invaluable at composing flawless text for subsequent reproduction.

Word processing programs

Word processing programs allow you to create documents with extensive editing features that a typewriter, even a high-end electronic typewriter, does not allow. These editing features are what distinguishes one word processing program from another. Regardless of manufacturer and because there are so many word processing programs used in Navy Graphics shops, this segment covers only the features common to the majority of programs.

Word processing software features

Word processing programs simplify the creation of documents. The program features manipulate the text in every imaginable way. Read the owner/user manual for the software on the computer at your shop. Each program offers a combination of features in the following categories:

DOCUMENT FORMAT: Format a document before entering the text of the document by setting the parameters for margins, justification, centering text, aligning text with the right margin, setting headers, footers, endnotes, and pagination.

TEXT ATTRIBUTES: Text attributes include the ability of the program to change typefaces and sizes, to bold, underline, or italicize, and to display and print.

EDITING FEATURES: Editing features include text search and replace, automatic hyphenation, automatic word wrap, columnization, special character definition, mail merge, incorporation of lines, boxes, or images, delete, insert, block, move text, a thesaurus, a spell check, and grammar and style checker.

SPECIALIZED FEATURES: Some programs offer index construction, table of contents construction, line numbering, and macros which set specific repetitive steps used frequently into one keystroke for rapid recall.

Graphics Programs

Introduction   As a DM, you will be using some type of graphics software package in your shop. More shops are becoming computerized and just as the command mission varies at each duty station so does the graphics software requirements. Periodically assess the computer graphic capabilities of your shop and stay as current as you can.

Graphics software   Graphics software allows you to create artwork and images to stand alone or to insert into text. Some programs create primarily presentation graphics in the form of 35mm slides, overhead transparencies, electronic presentations, and audience handouts. Other graphics software allows you to modify or combine existing artwork, edit and enhance photographs, create line graphs, pie charts, and organizational charts. The two types of graphics software technology are bit mapping, or raster-based, and vector mapping. How easily the graphics program permits image manipulation and how sharp the resolution of that image is part of the software program. Monitor resolution, the VGA card, and the devices used to make the hard copy end product also affect resolution. Regardless of manufacturer and because there are so many graphics software programs used in Navy Graphics shops, this segment covers only those features common to the majority of programs.

Bit mapped software programs   Bit mapped images create an image using a point or hundreds of points of light in a matrix. These images are slower to manipulate and create than vector graphics but more spontaneous and easier to learn. Multi-layering bit mapped matrixes into distinct gridmapped forms is called raster-based imagery. Raster-based images create painterly effects and encourage creativity. They also require an enormous amount of power and memory which slows program execution. To modify or create in the bit mapped mode is to work at the pixel level which can be time consuming and tedious.

Graphics Programs, Continued

Vector mapped software programs

Vector mapped software is ideal for drawings, charts, graphs, and diagrams. It creates an image by defining line, position, shape, and fill pattern. You plot or vector a series of points to define a shape. This shape is calculated into a mathematical formula called an algorithm. Image manipulation and editing is automatically calculated by the computer when you change parameters, making modifications easy and fast. The use of a vector-based program requires preplanning and more computer savvy than a bit mapped program.

Graphics software features

Drafting, drawing, and painting are distinctly different functions and not all programs will be equally adept at processing all three. Base your choice of program on command requirements. Also, let your software drive your hardware. Select a software program that fulfills the needs of the command and allows for some growth. Purchase hardware based on software requirements. Invest in the very best monitor possible. All of this affects the graphics resolution, the ease of processing, and the end product. In general, graphics software programs offer the following features:

FILL: Fill is a command to fill a shape with color or pattern. Make sure the shape is completely closed or the fill will bleed into the adjacent area. Color or pattern selection is nearly limitless.

BELZIER CURVES: The axis of a Belzier curve automatically changes as you move the cursor or mouse across the screen.

GEOMETRIC SHAPES: These are closed shapes whose major and minor axis change with the movement of the cursor or mouse.

DELETE: Use a geometric shape to surround or isolate segments you want removed from the image and click into place. Then press the DELETE key to remove everything inside the geometric shape.

UNDO: UNDO is a feature that eliminates the last command given and its associated affects.

Graphics Programs, Continued

Graphics software features (Continued)

ONE- or MULTI-LAYERING: Graphics programs create artwork on one layer where everything is visible to you, or on multi-layers where different aspects of the image are on different layers. Multi-layering complicates modification because you cannot always see how under layers are affected.

SCALE: Most programs offer scale changes to both the vertical and horizontal dimensions.

BRUSH/PENCIL/PEN NIB/SPRAY: Selection between the effect of a brush stroke, the nuances of a pencil or pen nib, and the splattering of an aerosol spray are common icons that mimic traditional drawing tools.

STROKE or SPRAY WIDTH and SHAPE: A wide or narrow stroke that is either round or square are selections available that pertain to the number of pixels modified at once.

Your attitude toward graphics software

Not only do graphics programs require more memory and power and greater capacity VGA cards and monitors, but they also require more of you. The only way to become proficient in graphics software is by constant use. The computer and associated software will not supplant you. You must gain the knowledge to master the program and use this tool beneficently. Sit down, read the owner/user manual, and experiment with the computer.

Desk Top Publishing Programs

Introduction   As DMs, we are primarily concerned with the creation of artwork, but we are increasingly tasked with massive text and the preparation of it for reproduction. The distinction between Lithographer's Mates (LI), who traditionally use desk top publishing programs, and DMs is less distinct. Desk top publishing (DTP), often called electronic pre-press preparation, is gaining popularity; become familiar with it.

Desk top publishing software programs   Desk top publishing software programs electronically integrate text and graphics into newsletters, advertisements, letterheads, reports, brochures, catalogs, and books, such as this TRAMAN. These programs allow you to see the page and alter it on screen before committing it to print. The range of manipulation is extensive. So, too, are the plethora of programs offered by manufacturers. Regardless of manufacturer and because there are so many desk top publishing programs used in Navy Graphics shops, this segment covers only those features common to a majority of programs.

Desk top publishing software features   Desk top publishing software features can be broken into three basic categories. These categories — composition, layout, and graphics — combine to make a comprehensive package for designing and publishing documents.

COMPOSITION: Composition defines the sizes and styles of type, the amount of space between horizontal letters and vertical lines, and the coding of the text copy to meet standards. You can edit text directly or input text from documents created in a word processing program and imported into the DTP software.

LAYOUT: Layout involves the arrangement of text and graphics on the page. Electronic pasting moves text from one portion to another and incorporates illustrations into the text. Some features include multiple columns, column widths, and gutter space manipulation, printing vertically or horizontally on a page, automatic copyfitting, automatic page numbering, and adding headers and footers.

Desk Top Publishing Programs, Continued

Desk top publishing software features (Continued)

GRAPHICS: Desk top publishing graphics features can scan or import illustrations/graphics either from hard copy or digital data. You can add images, borders, lines, and arrows. You can alter or edit images by shrinking or expanding them and create a layered four-plate color separation for color reproduction. You can also import images from other scanners and programs.

Communications

Introduction   Computers can communicate electronically with other computers via a local area network (LAN) or a wide area network (WAN). When individual workstations interconnect and have access to each others information ardor resources, it is called a network. These networks consist of nodes, the hardware, and are interconnected by links, the communications media of twisted-pair wire, coaxial cable, or fiber-optic cable.

Local area networks (LAN)   Workstations that use a local area network (LAN) are usually in close proximity to each other, often in the same building. A LAN can transfer data, files, and programs from one PC to another or even from one LAN to another LAN.

LAN configurations   LAN configurations or topology is the physical arrangement of the LAN components. The three common configurations are the star, the bus, and the ring network. In the star configuration, each component connects directly to a central computer or network server. In the bus configuration, all workstations connect to the same cable and the far ends of the cable never meet. In a ring network, all components connect to a cable and this cable forms a ring. Each configuration offers a compromise in advantages and disadvantages. Your LAN configuration was probably already set up before you arrived or tapped into it.

LAN communication   It takes network software, communications software, and interfacing software to make a LAN network work correctly. Also, each workstation must have a network interface card (NIC).

Wide area networks (WAN)   Wide area networks cover a larger geographical area than a LAN system. Examples of a WAN would include the Internet, Bulletin Board Services (BBS), electronic mail (E-Mail), and the world wide web (WWW). You may or may not have the opportunity to access any of these networks from your workstation in the graphics shop.

Security

Introduction DMs often work on classified or sensitive data. Graphics and text created electronically and stored on disks require protection. The procedures for protecting and marking disks, disk drives, and workstations differ slightly from what you are familiar with for hard copy data. Security procedures for electronic data is found in the *Department of the Navy ADP Security Manual,* OPNAVINST 5239.1.

Automated data processing security officer (ADPSO) Your command will have an automated data processing security officer (ADPSO) that reports to the commanding officer concerning the protection of electronically generated data. The ADPSO is responsible for the physical security of each computer workstation. The protection of each workstation involves physical security, physical access control, data file protection, and natural disaster protection. Seek out your ADPSO and make sure your workstation complies with Navy and command regulations for the protection of classified material.

Security The three levels of data processed electronically are Level I, Level II, and Level III. If your command processes Level I and/or Level II data, it must provide a specific degree of protection. The following table defines the three levels of data:

Level	Meaning
Level I	Classified; Confidential, Secret, and Top Secret
Level II	Unclassified; requires special protection, such as For Official Use Only and data covered by the Privacy Act of 1974
Level III	Unclassified

Security, Continued

Level I   Level I data (classified) handling requirements and procedures are similar to those for handling hard copy classified material. You are responsible for safeguarding this information at all times. Within Level I, the four modes of secure electronic processing of classified data are the system high, the dedicated, the multilevel, and the controlled mode. The following table specifically defines the four security modes:

Mode	Definition
System high	All computers on the network and connected peripherals protect data according to the requirements for the highest classification category and type of material contained in the system. This requires a security clearance but not necessarily a need-to-know for all material in the system.
Dedicated	Specific users or a group of users with a security clearance and a need-to-know for the processing of a particular type of classified material exclusively use and control all of the computers and peripherals on a system.
Multilevel	Various types and categories of classified material stored and processed concurrently in a computer system that permits selective access to material by uncleared users and users with differing security clearances and need-to-know. This is a function of the operating system and associated system software.
Controlled	A computer system in which at least some users with access to the system have neither a security clearance nor a need-to-know for all classified material in the system.

Security, Continued

Level II
Level II data is unclassified data that requires special protection. Examples are data For Official Use Only and data covered by The Privacy Act of 1974. To assure protection for processing Level II data, the Navy established the limited automated information system access security mode. A system or network operating in the limited access security mode restricts the access to data only to individuals who by their job function have a need to access the data.

Level III
Level III does not require the safeguards of Level I or Level II data. It does however, require proper handling to make sure that data is not lost or destroyed.

Electronic media
The computer system and its associated peripherals require controlling and safeguarding at all times. This includes the disks, diskettes, disk drives, monitors, printer ribbons, and generated hard copy. In general, the two types of electronic media are working copy media and finished media.

WORKING COPY MEDIA: Working copy media is temporary information. It stays within the confines and control of your activity. After creating a working copy, retain it for 180 days before destruction. Examples of working copy media are information used and updated at frequent intervals.

FINISHED MEDIA: Finished media is permanent information. It can be released to other commands and activities. Finished media contains information that does not change or is pertinent for more than 180 days.

Security controls
Date and mark classified electronic media when it is created. Control electronic media in the same manner prescribed for classified material. Protect working copy media according to the highest classification ever recorded on the media. For media classified Top Secret or Secret, maintain a master list including the overall security classification and the identification number permanently assigned to the disk.

Security, Continued

Disk security markings

To avoid confusion, set aside groups of disks for recording classified data at each security level. Mark each disk or diskette with a stick-on label with the overall security classification and a permanently assigned identification number. When you declassify and degauss the disks, remove all external labels indicating the classification unless you immediately use the disk to store information of the same classification level.

Display screen security markings

When you use the computer to create classified graphics and text, make sure to mark the computer monitor at the top above the screen with the appropriate security classification.

Hard copy security markings

Mark hard copy reports or printouts from a printer, terminal, plotter, or other computer equipment at the top-and-bottom-center of each page with the appropriate classification or the word unclassified. Number each page consecutively. In most cases, do so as you compose the artwork or text in the computer. If you are in doubt about security markings, consult OPNAVINST 5510.1.

Media disposition

Magnetic media, such as disks, eventually wear out or become damaged. If the disk contained classified material, degauss or erase it before destruction. Handle and dispose of printer ribbon and carbon paper used to print/transfer classified information according to the highest classification level of the data printed by that ribbon or carbon. Follow the requirements outlined in the OPNAVINST 5510.1.

Equipment inventory

In addition to safeguarding the information in a computer, protect the custody of the system. Do not indiscriminately move the system in and out of work spaces. If you must loan equipment, limit equipment loans and have borrowers sign for custody of the loaned gear. Keep an inventory identifying the equipment by make and model, the type of system the equipment is part of, the mode the equipment operates in, what kind of information and media the computer processes, and the level of sensitivity for the highest classification of material processed. Post the name and phone number of the physical security officer and/or ADPSO near the workstation.

Summary

Review This chapter briefly covers a computer system, its associated peripherals, and the differences between hardware and software. Because of the plethora of applications software available in the fleet and the absence of standardized programs in graphic shops throughout the Navy, specific software packages were not covered in detail. Stringently follow security procedures and provide adequate protection for classified material in the electronic format. If you are not knowledgeable on safeguarding classified material, find the authority in the command and assess the integrity of your shop.

Comments Computerization is the single most significant event of the twentieth century. It impacts every aspect of life. Take a serious look at how computers affect you. Even your local pizza parlor can speculate on your life by analyzing your choice of pizza ingredients and how often you order, whether you pay by check, and how much you tip the driver. You must become computer literate. Navy Graphic shops, printshops, and photo labs are all incorporating electronic imagery and digitization. Future Navy and civilian correspondence courses, such as this rate training manual, will be on CD ROM for print on demand. You don't have to like it, but you must master this medium. Do not be afraid of damaging the computer; the worst that will happen is that you lose some material you entered into it. It is here; the time is now. It is the future — the key to the twenty-first century.